

PATENT SPECIFICATION

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(19)

(54) CRAWLER VEHICLE TRACK HAVING A CONNECTING ELEMENT HAVING A SEAL SURFACE AND ADJACENT SURFACE OF DIFFERENT CONTROLLED PROPERTIES

(71) We, CATERPILLAR TRACTOR CO., a corporation organized and existing under the laws of the State of California, United States of America, of 100 N. E. Adams Street, Peoria, State of Illinois 61629, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

Heretofore utilized track link pins or bushings for tracks of crawler vehicles, often have a first surface area that cooperates with adjacent elements and needs a relatively high resistance to wear and an adjacent second surface area that is subject to high stresses and impacts. As is known in the art, such pins or bushings have generally been of a uniform surface hardness which is a compromise of the desired hardness of the two areas or they have been formed with the first surface area of different material from the second surface area.

Where the pin or bushing is of uniform hardness, the pin or bushing has undesirable properties for resisting wear and/or cracking and breaking. Where the surface areas are of differing materials a considerable amount of labour, material, and time is involved and this is expensive.

The present invention is directed to overcoming the difficulties set forth above.

According to the present invention, a track for a crawler vehicle has adjacent links pivotally connected to each other by a track link pin or bushing which has a first surface area engaged by a seal for retaining a lubricant in the pivotal connection and a second surface area immediately adjacent said first surface area, said first surface area having a hardness value of greater magnitude than that of said adjacent second

surface area, said first and second surface areas being of the same material and said seal being in contact with said pin or bushing only by its engagement with said first surface area.

Tracks in accordance with the invention and having two examples of pins or bushings will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of one example of the bushing;

Figure 2 is a sectional view of a portion of the bushing of Figure 1;

Figure 3 is a perspective view of another example which is a pin;

Fig. 4 is a sectional enlarged view of a portion of the bushing of Fig. 1.

Referring to Fig. 1, a track link bushing 10 of a crawler type tractor, has a first sealing surface area 12 that is cooperable with a seal 14 for retaining a lubricant and a second surface area 16 immediately adjacent the first seal surface area 12. A specific example of the track link bushing 10 would be in a sealed and lubricated track as manufactured by Caterpillar Tractor Co., Peoria, Illinois which is well known in the art.

The sealing surface area has a hardness value of greater magnitude than the adjacent second surface area 16 and the first and second surface areas 12, 16 are of common material, for example steel.

In the construction of the bushing 10 of this invention, the sealing surface area 12 is separated from an area of the element expected to be subjected to relatively high stresses and/or impacts. The sealing surface area 12 is separated from the high stress area of the bushing 10 by portions of the adjacent second surface area 16.

In the specific example of the bushing shown in Fig. 1, the high stress area would

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be against the walls 20 of the longitudinal opening 18 of the element 10.

By so spacing the sealing surface area 12 from the wall area of high stress, the sealing surface area 12 is protected from the damaging effect of stresses and impacts. Also, by controlling and differing the properties of these areas 12, 16, the resultant bushing 10 will have a second surface area 16 that is more resistant to stresses and impacts than the sealing surface area 12 and the sealing surface area 12 will be more resistant to wear than the second surface area 16. These properties are provided while maintaining both areas 12, 16 of common material.

In the track link bushing, the bushing has first and second ends 22, 24, first and second end surfaces 26, 28, and each of said end surfaces 26, 28 have a generally annular sealing surface area 12, 12' separated from the longitudinal opening 18 by a generally annular adjacent second surface area 16, 16'.

Referring to Fig. 2, the sealing surface areas 12, 12' of the track link bushing 10 are each of dimensions and at locations sufficient for being contacted by all portions of the seal 14 expected to contact the bushing ends 22, 24 in the use thereof. The sealing surface area 12 here extends from the second surface area 16 to the outer annular body surface 32 of the bushing 10.

Fig. 3 shows another embodiment where, for example, a track pin 10 has the annular sealing surface area 12 extending about the outer annular body surface 32. In this construction, the lubricant sealing extends about the body surface 32 and the areas of high impact and/or stresses are at other locations.

Referring to Fig. 4, the first sealing surface 12 is preferably, controlled formed in a previously heat treated connecting element 10 by self-quench hardening apparatus 34 such as, for example lazer, electron beam, high frequency induction, or plasma torch apparatus, preferably an electron beam apparatus.

In the processing of the previously heat-treated connecting element 10, the apparatus 34 is controllably oriented relative to the element 10 to treat only a preselected portion of the element 10, i.e., the preselected sealing surface area 12. The temperature of the metal of the surface area 12 is increased by the electron beam, for example, to a temperature sufficient for controllably hardening the seal surface area 12 to a preselected hardness value while maintaining adjacent surface area 16 free from processing by said beam.

The resultant hardness of the sealing surface area 12 is preferably greater than a Rockwell C hardness value greater than

about 60, more preferably in the range of about 60 to about 70, and, for connecting elements of a vehicle track, greater than about 66. The resultant hardness of the adjacent second surface area 16 is preferably a Rockwell C hardness value less than about 64, more preferably in the range of about 50 to about 64.

It should be understood that the relative difference in hardness between the areas 12, 16 is dependant upon the forces expected to be subjected on each area 12, 16 and one skilled in the art can easily select the desirable hardness of each area 12, 16 after these variables have been determined. It has been determined, however, that for many connecting elements utilized in the vehicle work art, the hardness difference between the areas 12, 16 should be greater than about 2 Rockwell C hardness value in order to realize an avoidance of waste.

Where the connecting element 10 is utilized on a work vehicle subjected to heavy loading and frequent relatively high stress and/or impacts, the hardness range as set forth above will provide the greatest avoidance of waste of materials, labor and time.

For the seal surface area 12, Rockwell C values less than about 60 are undesirable owing to the undesirable wear and resultant waste and Rockwell C values greater than about 70 are undesirable because of the absence of need for abrasion protection and hence lubrication retention offered by hardnesses above this value.

For the surface areas 16, 20, Rockwell C values less than about 50 are undesirable owing to undesirable wear and resultant waste and Rockwell C values greater than about 64 are undesirably brittle and have impact and/or stress resistant properties less than desirable which results in waste.

WHAT WE CLAIM IS:—

1. A track for a crawler vehicle, the track having adjacent links pivotally connected to each other by track link pin or bushing which has a first surface area engaged by a seal for retaining a lubricant in the pivotal connection and a second surface area immediately adjacent said first surface area, said first surface area having a hardness value of greater magnitude than that of said adjacent second surface area, said first and second surface areas being of the same material and said seal being in contact with said pin or bushing only by its engagement with said first surface area.

2. A track according to claim 1, in which both said first and said second surface areas are annular.

3. A track according to claim 1 or claim 2, wherein the first surface area is separated from an area of the pin or bushing which, in

- use, is highly stressed, by said second surface area.
4. A track according to any one of claims 1 to 3, in which there is a bushing and the bushing has first and second end surfaces, each of said end surfaces having a generally annular first surface area separated from the axial bore of the bushing by a generally annular, second surface area.
5. A track according to claim 1, in which there is a pin and the pin has a peripheral annular surface and each first surface area extends from the second surface area to the peripheral annular surface.
6. A track according to any one of the preceding claims, wherein the hardness of the or each first surface area has a Rockwell C value greater than 60.
7. A track according to claim 6, wherein the hardness of the or each first surface area has a Rockwell C value in the range of 60 to 70.
8. A track according to claim 6 or claim 7, wherein the hardness of the or each second surface area has a Rockwell C value less than 64.
9. A track according to claim 8, wherein the hardness of the or each first surface area has a Rockwell C value greater than 66 and the hardness of the or each second surface area has a Rockwell C value in the range of 50 to 64. 30
10. A track according to any one of the preceding claims, wherein the difference in Rockwell C hardness values between the or each first surface area and the or each second surface area is greater than 2. 35
11. A track according to claim 1, in which the pin or bushing is substantially as described with reference to Figures 1, 2 and 4, or Figure 3 of the accompanying drawings. 40
12. A tractor having tracks in accordance with any one of the preceding claims.

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1 SHEET

COMPLETE SPECIFICATION

*This drawing is a reproduction of
the Original on a reduced scale*

